Installation and Operating Instructions

DGPS/Glonass receiver SMART-6L with RTK radio modem

Version: V3.20150602

30302489-02-EN

Read and follow these operating instructions.

Keep these operating instructions in a safe place for later reference.

Company details

Document

Installation and Operating Instructions
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1 For your safety

1.1 Basic safety instructions

Please read the following safety instructions carefully before using the product for the first time.

- Do not make any unauthorized modifications to the product. Unauthorized modifications or use may impair safety and reduce the service life or operability of the unit. Modifications are considered unauthorized if they are not described in the product documentation.
- Comply with road traffic rules. Stop the vehicle before operating the GPS receiver or connected components.

Systems with modem

If you use the GPS receiver with a modem, note that the modem emits radio waves when switched on. These can interfere with other devices or be harmful to human health.

You should therefore follow the following instructions when using the GPS receiver with a modem:

- If you wear a medical device, ask your doctor or the device manufacturer about how to prevent hazards. Medical devices such as pacemakers or hearing aids can be affected by the radio transmissions of modems.
- If you wear a pacemaker, keep the modem away from the pacemaker.
- Switch off the modem as soon as you are close to petrol stations, chemical plants, biogas plants or other locations where combustible gases or fumes can occur. These gases can be ignited by a spark and explode.
- Maintain a minimum distance of 20 cm (8 inches) between the antenna of the modem and your body.
- Never switch on the modem in an aircraft. Ensure that it is not accidentally switched on during flight.

1.2 Intended use

The product is intended for accurate positioning of agricultural vehicles.

The product is intended exclusively for use in agriculture. The manufacturer shall not be held responsible for any other use of the system.

The operating instructions form part of the product. The product may only be used in accordance with these operating instructions.

The manufacturer cannot be held liable for any personal injury or property damage resulting from such non-compliance. All risk arising from improper use lies with the user.

1.3 Layout and meaning of warnings

All safety instructions found in these Operating Instructions are composed in accordance with the following pattern:

⚠ WARNING

This signal word identifies medium-risk hazards, which could potentially cause death or serious physical injury, if not avoided.

⚠ CAUTION

This signal word identifies low-risk hazards, which could potentially cause minor or moderate physical injury or damage to property, if not avoided.

NOTICE

This signal word identifies actions which could lead to operational malfunctions if performed incorrectly.
These actions require that you operate in a precise and cautious manner in order to produce optimum work results.

There are some actions that need to be performed in several steps. If there is a risk involved in carrying out any of these steps, a safety warning will appear in the instructions themselves.

Safety instructions always directly precede the step involving risk and can be identified by their bold font type and a signal word.

Example

1. NOTICE! This is a notice. It warns that there is a risk involved in the next step.
2. Step involving risk.

1.4 Disposal

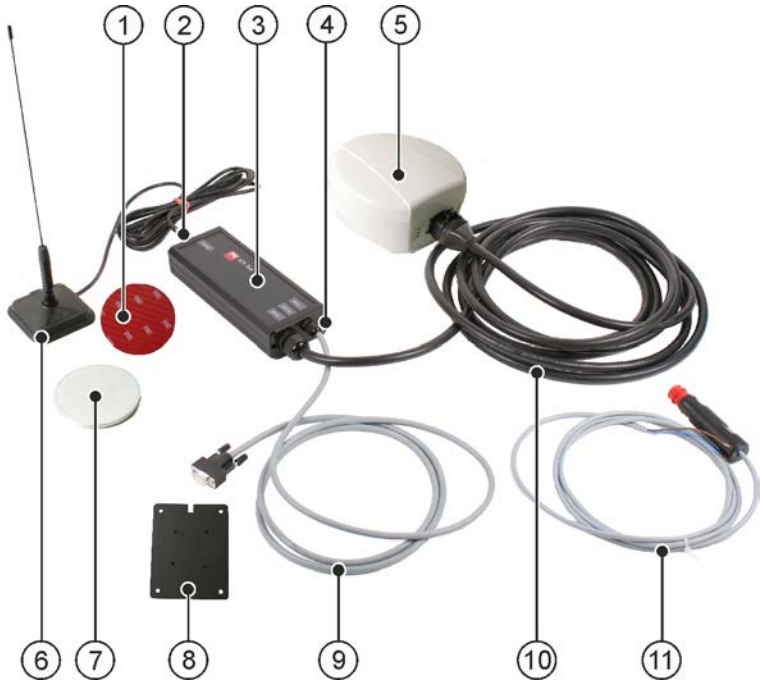
When it has reached the end of its service life, please dispose of this product as electronic scrap in accordance with all applicable waste management laws.

2 Product description

2.1 About the GPS receiver

The GPS receiver can be used worldwide. In Europe and North America, it works with the GPS system and the WAAS and EGNOS correction systems. In locations where WAAS and EGNOS cannot be used, the GPS receiver can use the GPS system together with Glonass satellites. The correction signal is then calculated internally (using GL1DE technology).

The GPS receiver can also function with other correction signals. In order to do this, the GPS receiver must be connected with a GPS modem or an RTK radio modem.



1	Adhesive plate for antenna	6	Antenna
2	Connector for antenna cable	7	Metal plate for antenna
3	Modem installed in junction box	8	Magnetic plate
4	Connector for the power supply cable	9	Connector cable for the steering job computer
5	DGPS/Glonass receiver SMART-6L	10	Connector cable - DGPS/Glonass receiver to modem
		11	Power supply cable

Glonass

Glonass is a Russian satellite system which can be used in addition to the American GPS system.

WAAS and EGNOS

WAAS and EGNOS are satellite-based correction services which can be used in Europe and North America.

GL1DE

GL1DE technology can be used in parallel to other methods. This thus further increases path-to-path accuracy.

RTK

Systems which work with RTK consist of a fixed base station and a mobile receiver. The base station transmits correction signals to the mobile receiver by means of a modem. This enables levels of accuracy in the centimeter range.

Accuracies

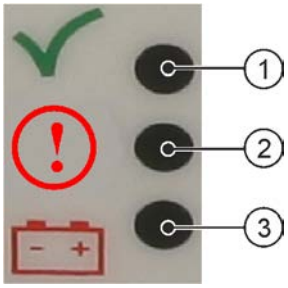
The accuracy of the GPS receiver is dependent on the site in which you are located.

Accuracy is also described using the following values:

- Path-to-path accuracy describes the maximum displacement of the GPS position during field work. A path-to-path accuracy of 2.5 cm means that the overlap or defect during parallel movements is a maximum of 2.5 cm.
- Absolute accuracy is the accuracy with which a movement can be repeated after days, months or years. An absolute accuracy of 2.5 cm means that the deviation of a movement after one year is a maximum of 2.5 cm. This maximum deviation also applies if, after one year has passed, you use the field limits, guidance lines, obstacles, etc. in the TRACK-Leader application from the previous year.

2.2 Meaning of the LED lights

The GPS receiver has three LED lights, which display the current state of the GPS receiver.



1	Green LED light	3	Red LED light
2	Yellow LED light		

- Green: The GPS receiver is receiving GPS signals.
- Yellow: The GPS receiver is not receiving GPS signals. There is a fault.

- Red: The GPS receiver is operating. The unit is live.

3 Brief instructions

This chapter will provide you with an overview of the steps which you will need to complete in order to use the product.

1. Mount the GPS receiver. [→ 10]
2. Mount the antenna. [→ 11]
3. If you want to connect a terminal, you will need to prepare a junction box for connecting a terminal. [→ 11]
4. Secure the junction box with the modem in the vehicle. [→ 13]
5. Connect the components. [→ 14]
6. Activate the GPS receiver on a terminal. [→ 15]
7. Configure the GPS receiver [→ 15].

4 Assembly instructions

4.1 Mounting the GPS receiver

GPS receiver on the roof of a tractor

NOTICE

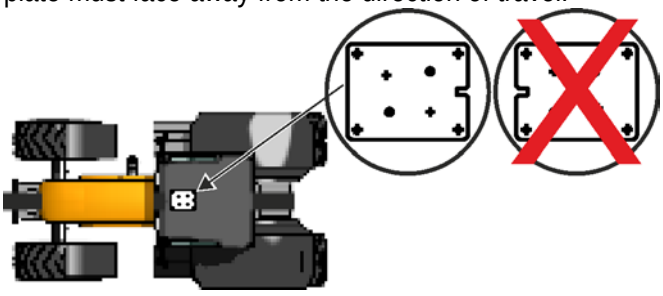
The GPS receiver needs an open view of the sky.

- Mount the GPS receiver on the roof of the vehicle cabin.
- Avoid obscuring the GPS receiver's view of the sky.

Procedure

You fit the GPS receiver as follows:

1. Identify a suitable location on the roof of the vehicle: as far forward as possible, and in the center of the vehicle.
2. Use alcohol to clean the position on which will you want to mount the GPS receiver.
3. Expose the adhesive surface of the magnetic plate. The notch in the magnetic plate must face away from the direction of travel.



4. Place the GPS receiver onto the magnetic plate so that it locks. The connection must thus face away from the direction of travel.

⇨ You have now mounted the GPS receiver onto the roof of the vehicle.

⇨ You can now connect the GPS receiver to a terminal.

4.2 Mounting the antenna

⚠ CAUTION

Crushing hazard from a very strong magnet
The base of the antenna is a very strong magnet.

- Never insert your fingers between the base of the antenna and a metal surface.
- Grip the antenna firmly in your hands, but do not place your fingers on the magnetic base.

NOTICE

The antenna requires an unobstructed view of the sky.

- Mount the antenna on the roof of the vehicle cab.
- Avoid placing the antenna in the shade.

Procedure

To mount the antenna:

☑ You have fitted the GPS receiver.

1. Identify a suitable location on the roof of the vehicle: this should be as far away as possible from the mounted GPS receiver.
2. Use alcohol to clean the position on which will you will mount the antenna.
3. Glue the double sided adhesive plate to the cleaned surface.
4. Clean the provided metal plate.
5. Remove the paper from the adhesive plate and glue this onto the metal plate.
6. Position the antenna on the metal plate.

⇨ You have fitted the antenna.

4.3 Preparing a junction box for connecting a terminal

If you are using the junction box on a terminal and without automatic steering, you need an additional power supply.

⚠ WARNING

Physical injury due to electrical shock
If voltage is present during assembly, this can lead to physical injury due to electrical shock.

- Disconnect the power supply from the vehicle battery before working on the junction box.

⚠ CAUTION

Damage to the vehicle's electrical system

Switching the polarity of the cables can cause damage to the vehicle's electrical system.

- Pay attention to the polarity of the cable cores and the terminals.

Procedure

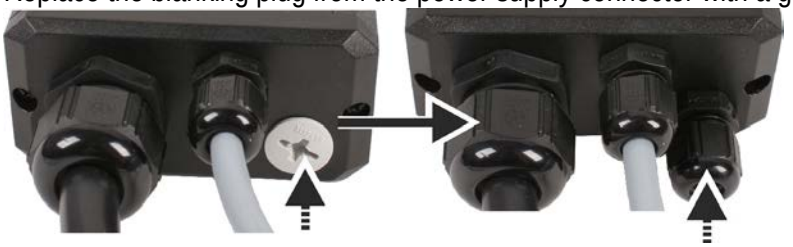
Proceed as follows if you want to connect the power supply cable:

☑ The junction box is not connected to the power supply.

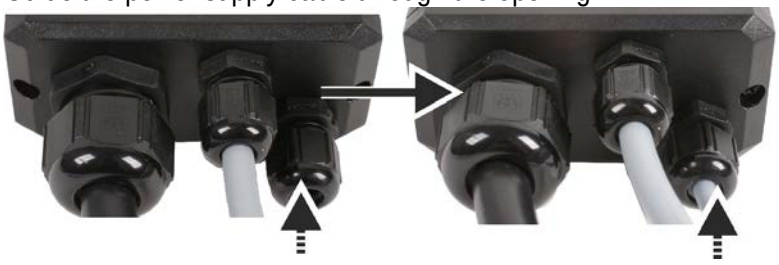
1. Screw the junction box open.

2. Slide the lid of the junction box carefully to the back.

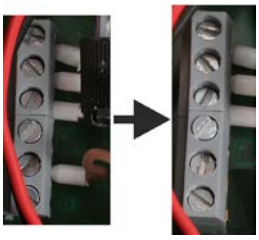
3. Replace the blanking plug from the power supply connector with a grommet.



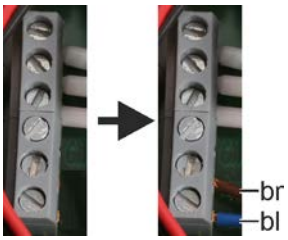
4. Guide the power supply cable through the opening.



5. Remove the brown cable core from the left clipper block. Use a screwdriver to do this.



6. Insulate the removed brown cable core because it is live.
7. Insert the cable core of the power supply cable into the clipper block. Pay attention to the proper colours. You can also see the proper colour by the abbreviation beside the clipper block. The table at the end of this section shows the abbreviations for the colours.



8. Close the screw connections of the connectors.
9. Slide the lid of the junction box back on.
10. Screw the junction box closed.

⇨ You have prepared the junction box for connection to a terminal.

Abbreviation	Color
gn	green
ge	yellow
ws	white
br	brown
bl	blue

4.4 Securing the junction box in the vehicle

To secure the junction box in the vehicle:

☑ You have prepared a junction box for connecting a terminal if you want to connect a terminal.

1. Find a dry spot in the vehicle cab. Make sure that the distances between the junction box, the GPS receiver and the antenna are not too large so that the cables are sufficiently long.
2. Secure the junction box tightly.

⇨ You can now connect to the individual components.

4.5 Connecting the components

⚠ CAUTION

Kink damage to the antenna cable
The antenna cable can become damaged if it is bent during installation.

- Do not bend the antenna cable.

⚠ CAUTION

Damage to the vehicle's electrical system
Switching the polarity of the cables can cause damage to the vehicle's electrical system.

- Pay attention to the polarity of the cable cores and the terminals.

Procedure

To connect the components:

☑ You have fitted the GPS receiver.

☑ You have fitted the antenna.

☑ You have fitted the junction box.

1. Run the cable for the GPS receiver from the junction box out of the vehicle cab.
2. Connect the cable to the GPS receiver.
3. Run the antenna cable into the vehicle cab.
4. Connect to the antenna cable to the junction box.
5. Connect the junction box with the steering job computer or the terminal by means of the connector cable.
6. If you are not going to use a steering job computer, connect the power supply cable to the appropriate power supply socket on the vehicle. Ensure that voltage is only generated when you are working with the GPS receiver. This will keep your data volume low.

⇨ You have connected to the components to each other.

4.6 Activating the driver of the GPS receiver on a terminal

You will need to activate the GPS receiver differently depending on where you have connected it.

Version	Driver
Via the terminal's serial interface	"AG-STAR, SMART-6L" or "GPS_STD"
Via the TRACK-Leader TOP steering job computer	"PSR CAN"
Via the TRACK-Leader AUTO steering job computer	"TRACK-Leader AUTO"

You can read how to activate a driver in the operating instructions for the terminal.

4.7 Configuring the GPS receiver

The GPS receiver can be configured differently for various terminals. You can find out how to do this in the operating instructions for the terminal.

The following tables show the values which you can select in the parameter "correction signal" during configuration:

Value	Path-to-path accuracy	Absolute accuracy	Comment
EGNOS/WAAS	15cm	60cm	
EGNOS/WAAS + GL1DE	<15 cm	60cm	
GL1DE	15-18cm	70cm	Alternative to EGNOS/WAAS for India, Africa and South America
RTK radio	2cm	2.5cm	
RTK-GSM	2cm	2.5cm	
TerraStar	5cm	5-10cm	

Information for GL1DE

If you have selected a correction signal with GL1DE, please note:

- Switch the GPS receiver off when driving on roads.

- After starting the systems each time, it takes ca. 5 minutes until the system is ready for operation. Wait on the field to be worked during this time, before you start working.
- Ensure that the GPS receiver does not lose the GPS signal during work. If the signal gets lost, it can cause the GL1DE to restart. This can lead to track offset.

Information for TerraStar

If you have selected "TerraStar" as a correction signal, please note:

- The accuracies are available ca. 10 to 15 minutes after switching on the GPS receiver under the open sky.
- If the GPS signal fails due to shadowing by buildings or trees, the full accuracy is only available again after ca. 5 minutes. For this reason, you should avoid driving along rows of trees or buildings.

5 Technical specifications

GPS receiver SMART-6L

Operating voltage	8 – 36 V DC
Current consumption	241 mA at 12V DC
Power input	2.9 W
GPS standard	NMEA 0183
Frequencies	GPGGA, GPVTG, GPGSA, GPZDA, GPRMC
Transmission rate	19200-115200 baud
Data bits	8
Parity	no
Stop bits	1
Flow control	None

Radio modem

	VHF	UHF
Operating temperature	-40 - +75 °C	-40 - +75 °C
Storage temperature	-40 - +85 °C	-40 - +85 °C
Transmission rate	1200-38400 Baud	300-38400 Baud
Data bits	8	8
Parity	no	no
Stop bits	1	1
Operating voltage	8 – 30V DC	9 – 30V DC
Current consumption	550 mA at 1 2V DC	585 mA at 1 2V DC
Band	135-174 MHz	403-473 MHz

6 List of accessories

GPS receiver

Item number	Item name
3030247606	DGPS/Glonass receiver SMART-6L with connector cable to the terminal
3130247606	DGPS/Glonass receiver SMART-6L with no connector cable to the terminal

Complete GPS receiver package with additional components

Item number	Item name
3030248901	DGPS/Glonass receiver SMART-6L with GSM modem, GSM antenna and RTK activation
30302489	DGPS/Glonass receiver SMART-6L with VHF radio modem (135-174 MHz), VHF mobile antenna and RTK activation
3030248900	DGPS/Glonass receiver SMART-6L with UHF radio modem (403-473 MHz), UHF mobile antenna and RTK activation

Retrofit

Item number	Item name
3030248920	GSM modem
3030248912	GSM antenna for GSM modem
3030248921	VHF radio modem (135-174 MHz)
3030248922	UHF radio modem (403-473 MHz)
3030248910	Mobile antenna for VHF radio modem
3030248911	Mobile antenna for UHF radio modem
3030248931	RTK activation

Connection cable

Item number	Item name
31302476	Connector cable - DGPS/Glonass receiver to terminal
31302453	Adapter cable for connection to the TRACK-Leader TOP steering job computer

Mounting accessories

Item number	Item name
3130247601	DGPS/Glonass receiver – Magnetic plate and adhesive tape

Additional items

Item number	Item name
3030248150	RTK base station, VHF max. 5 W
3030248151	RTK base station, UHF max. 35 W